

## REMARKS

It is understood that Applicants' Response to Final Rejection filed February 27, 2008 has been entered. If this is not the case, it is respectfully requested that the Response be entered in view of the Request for Continued Examination filed herewith.

### **The Final Rejection under Section 102(b) over Ballard**

The final rejection rejected claims 19-21, and 23-37 under 35 U.S.C. 102(b) as allegedly anticipated by Ballard et al. (US 6,171,489).

The final Office Action took the position that the polymer bead product disclosed in the Ballard reference is identical to the presently-claimed polymer bead product, and was made by the same method. The Office Action alleged that col. 4, lines 5-12 of the reference discloses that suitable crosslinking monomers and functional monomers include the presently-recited amine group-containing monomers and those which can be post-reacted to form the amine functionality. The Final Office Action further stated that the Examiner takes the position that ion exchange resins fall within the scope of complexing resins and that by definition, ion exchange resins contain functional groups that lend the resin capability of combining with or exchanging ions between the resin and a solution. Thus, the Office Action concludes that "complexing" occurs as a function of the mode of action of an ion-exchange agent. Further, the Office Action states that depending on the amount of trimethylamine/hydrochloric acid added, not all aminated sites are in the form of quaternary ammonium groups, and thus would be capable of complexing a transition metal cation, and that the cited art specifically teaches using functional monomers including dimethylaminoethyl methacrylate N,N-dimethylaminopropyl (meth)acrylamide, vinyl

pyridine, diallylamine, N-vinyl formamide, which all contain amine functional groups capable of complexing a transition metal cation (citing col. 4, lines 5-11 of the reference).

### **Applicants' Previous Arguments**

Applicants previously argued that the key to understanding the difference between the presently-claimed resin and that described in the reference is an appreciation of the distinction between a **“complexing resin”** as claimed herein and an **“ion-exchange resin”** as disclosed in the cited reference.

An ion-exchange resin is known in the art as a resin containing functional groups **having ionic charge** that is neutralized with either a negative or positive counter-ion. Upon being exposed in a solution containing solubilized cations or anions, the counter-ions associated with the resin exchange with the ions in the solution. Removal of the now "exchanged" ion-exchange resin from the solution therefore results in the ions originally in the solution being removed and counter-ions originally associated with the resin remaining in the solution. Resins that provide for such a net process are therefore known in the art as ion-exchange resins.

In contrast, a complexing resin is known in the art as a resin containing functional groups **in a neutral state** having an electron pair available for coordinating or complexing with a Lewis acid such as a transition metal cation. A person skilled in the art would appreciate that the process of complexation is a combination process that does not involve any exchange whatsoever. Thus, in the context of the present invention, the complexing resin comprises amine groups capable of complexing a transition metal cation. Upon being exposed in a solution containing solubilized transition metal cations, the neutral electron pair donor functional group (*i.e.*, the amine (N) group) associated with the complexing resin forms a complex with the solubilized cations. Removal of the now "complexed" complexing resin from the solution removes the cations originally in the solution without anything from the resin being exchanged back into the solution.

By virtue of the different chemical nature of complexing and ion-exchange sites, and the different mechanisms by which each site operates, complexing resins and ion-exchange resins have different capabilities and inherently present a different net effect in use.

### **The Advisory Action**

The Advisory Action asserts that Applicants' Response to the final rejection does not place the case in condition for allowance, for the following reasons:

The crux of applicant's argument lies in the different modes of action between complexing resin and ion exchange resin. This not found to be compelling as such features are not recited in the rejected claims. Taken the broadest interpretation of the recited complexing resin, the examiner remains of the position that prior art polymeric beads derived from the same monomers and other recited elements, produced by the same process would inherently expected to function as a complexing resin as claimed. Prior art clearly teaches the utility of the recited functional monomers including amine group-containing functional monomers in the formation of polymer beads, and the ability of the resultant product in separating transitional metal ions such as cadmium and zinc from solution (col. 4, lines 5-12; col. 6, lines 51-54). Thus, meeting the requirement of the recited claims. Accordingly, the examiner's position is maintained.

### **Traversal of Rejection**

The arguments advanced by the Patent Office in the final Office Action and Advisory Action are addressed below:

#### **1. The presently-claimed resin beads are not the same as the Ballard resin beads.**

As evidence that the term "ion exchange resin" (as used in the Ballard reference) has a different meaning in the art from "complexing resin" (as used in the present claims), attached hereto as Exhibit A are pages 2 and 3 from W. Holl, "Fundamentals of Ion Exchange," Forschungszentrum Karlsruhe, Institute for Technical Chemistry, Sections 1.1.2 and 1.1.3. This document defines the term "ion exchange" as follows:

Ion exchangers are solid materials which are able to sorb positively or negatively charged ions from an electrolyte solution and **release** an

equivalent amount of other ions of equal charge sign to the solution. . . .  
The exchanger consists of a so-called matrix which bears a positive or negative excess charge. This excess charge is localised in elementary cells or functional groups. [Emphasis added.]

\*\*\*

- There is an **exchange** of ions, **no one-way uptake**. [Emphasis added.]
- The exchange is strictly stoichiometric.
- The exchange is reversible.

Contrary to the arguments in the Office Actions, the polymer bead product disclosed in the Ballard reference is **not** a complexing resin as claimed herein, and is **not** identical to the presently-claimed polymer bead product, nor was it made by the same method. Applicants agree that the reference, at col. 4, lines 5-12, discloses a group of functional monomers that overlaps with the functional monomers disclosed herein, and that the reference discloses suitable crosslinking monomers for use in the present process. Note that the reference at col. 3, lines 55-60 discloses that “the functional monomer should provide the necessary functional groups **to give the polymer an ion-exchange capability or provide sites that may be later reacted to provide the required functional groups to confer ion-exchange capability** to the polymer.” [Emphasis added.] At col. 6, lines 55-47, and in Examples 1 and 3, the Ballard reference teaches that quaternization is necessary to provide the ion-exchange capability to an amine-containing compound.

Note that the method used to make the Ballard resins requires that they be reacted until they are capable of serving as “ion-exchange” resins. (Col. 3, lines 55-60). In contrast, the present claims require that the resin be a complexing resin containing amine functional groups able to complex transition metal ions. Thus, in Ballard, amine groups are reacted until quaternary amines are formed, whereas in the presently-claimed resins, the amine groups are not reacted all the way to quaternization.

Compare Example 1 of the reference with Example 1 of the present application and note that the quaternized end product of the reference is an ionic compound, whereas the aminated end product hereof is a neutral compound. As previously pointed out,

complexing resins do not have “ions” to exchange. They have **neutral** charges and provide **one-way uptake** rather than an exchange of ions with the solution. Thus, when the Ballard reference states that the polymer must have “ion-exchange capability” or be later reacted to provide functional groups that confer “ion-exchange capability,” it means that the functional groups must have an ionic charge and be capable of providing **an exchange of ions** from solution, **and not one-way uptake**. One-way uptake is provided by complexing resins, and that is why complexing resins are not ion-exchange resins.

Even if the ionic bond between an ion in solution and a functional groups of an ion-exchange resin could be considered in some general sense to be a “complex,” this does not convert the ion-exchange resin of Ballard to a “complexing resin” as claimed herein. The Ballard resin behaves as an ion-exchange resin, exchanging ions with the solution; it is described in the reference as an ion-exchange agent; and it is, in fact, an ion-exchange agent. The presently-claimed resin is not an ion-exchange resin because it does not exchange ions from solution, and therefore does not meet the art-known definition of an ion-exchange agent. Thus the Ballard resin beads are different from, and do not anticipate, the presently-claimed resin beads.

In consequence, it is respectfully submitted that the statement in the final Office Action that the Ballard ion exchange resins fall within the scope of the “complexing resins” claimed herein, and are made by the same process is incorrect.

## **2. The Ballard process would not produce unquaternized amine groups that could complex transition metal ions.**

The Office Action states that in the Ballard process, “depending on the amount of trimethylamine/hydrochloric acid added, not all aminated sites are in the form of quaternary ammonium groups.” However, the trimethylamine used in the Ballard Examples is a tertiary amine. Reaction of this amine with the epoxy group of the glycidyl methacrylate moiety (as shown at the top of column 9) by default forms a fourth bond to the nitrogen atom thereby forming the quaternary ammonium ion-exchange site. Thus, contrary to the

comments in the Office Action, by virtue of the reaction mechanism, all of the aminated sites produced must be in the form of a quaternary ammonium group.

Under conditions used to convert amine groups to quaternary ammonium groups, any amine groups that were not converted (if this were to occur at all) would by default not be available for reaction and therefore inherently also not available to function as complexing sites. Accordingly, if a given reaction did not result in complete conversion of the amine groups into quaternary ammonium groups, then any residual amine groups would also not be capable of complexing a transition metal cation.

Moreover, the Ballard reference **requires** quaternization of amine compounds so that they can serve as ion-exchange agents. Because the Ballard reference requires quaternization, it **necessarily** would perform the process of making resins containing any amine groups in such a way as to achieve quaternization, and thus would not produce a complexing resin.

Even if some amine groups did accidentally escape quaternization, this would not convert the Ballard reference to an anticipating reference. An anticipating reference must be one that makes it clear that the alleged material is necessarily present and would be recognized to be so by one skilled in the art. Finally, it is mere **speculation** for the Office Action to imply that the Ballard process could be conducted in such a way as to produce amine groups that escape being quaternized in the required quaternization reactions.

MPEP Section 2112, Section IV states:

The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. In re Rijckaert, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993) (reversed rejection because inherency was based on what would result due to optimization of conditions, not what was necessarily present in the prior art); In re Oelrich, 666 F.2d 578, 581-82, 212 USPQ 323, 326 (CCPA 1981). "To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result

from a given set of circumstances is not sufficient." In re Robertson, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999).

The Ballard reference fails to make it clear that unquaternized amine groups would necessarily be present. Speculation that they might be present is not sufficient to support an anticipation rejection.

### 3. The distinguishing features of the present resin are recited in the claims.

The Office Action states that the crux of Applicants' argument lies in the different modes of action between complexing resins and ion exchange resins, and that this is not found to be compelling because such features are not recited in the rejected claims. It is submitted that these features are recited in the claims. The independent claims read as follows, with the language distinguishing over the Ballard reference highlighted:

19. Polymeric beads of **complexing resin** comprising a polymer matrix having magnetic particles and a dispersing agent dispersed substantially uniformly therein, wherein the polymer matrix incorporates **amine groups capable of complexing a transition metal cation**.
21. Polymeric beads of **complexing resin** prepared by a process which comprises producing a dispersion having a continuous aqueous phase and a dispersed organic phase, said organic phase comprising one or more polymerizable monomers, magnetic particles and a dispersing agent for dispersing said magnetic particles in the organic phase; polymerizing said one or more polymerizable monomers to form polymeric beads incorporating said magnetic particles, wherein said polymeric beads include **amine groups that are capable of complexing a transition metal cation and that are** provided by polymerized residues of said one or more polymerizable monomers, or wherein said polymeric beads are reacted with one or more compounds to provide **amine groups capable of complexing a transition metal cation**.

**A. Complexing resins.** The Ballard reference discloses ion exchange resins, not complexing resins. Complexing resins are recognized in the art as not being ion-exchange resins. In addition, in the present specification complexing resins are distinguished from the ion-exchange resins of Ballard. See page 3, line 22 to page 4, line 6. As stated above, Australian patent No. 704376 is the Australian counterpart to the cited Ballard U.S. patent. The Specification hereof makes it clear that the term “complexing resins” does not include ion-exchange resins. Therefore, the term “complexing resins” used in the claim distinguishes the claimed resins from the Ballard ion-exchange resins. As is well-established, a patentee may be his own lexicographer (MPEP Section 2111.01, Section IV). Thus, the way the term “complexing resins” is used in the specification governs how its meaning in the claims should be interpreted, i.e., as not encompassing ion-exchange resins. Moreover, this discussion of the meaning of the term “complexing resins,” confirming its meaning in the prosecution history of this application, ensures that the term “complexing resins” must be interpreted in such a way as to exclude the “ion-exchange” resins of the prior art.

**B. Amine groups capable of complexing transition metal ions.** The present claims specify that the resin comprises amine groups that are capable of complexing transition metal ions. With respect to transition metal ions, the Ballard reference discloses that hydrolysis of polyethyl acrylate beads will provide a weak acid cation ion exchange resin suitable for separating transition metal ions (col. 6, lines 51-54). The reference does **not** disclose or suggest that **amine** functional groups, as claim herein, are suitable for separating transition metal ions.

The presently-claimed resin was developed to provide a different resin having a different functionality than that of Ballard. The Assignee of the present application is the same as the Assignee of the cited reference. The resin described in the Ballard reference is characterized at page 3, lines 22-31 of the present Specification as follows: “the resins contemplated in Australian patent No. 704376 [the Australian equivalent of the cited reference], are not particularly suitable for use in separating transition metals from



aqueous solutions as they would have poor capacity utilization due to their low selectivity for transition metals over innocuous background ions.”

The ability to selectively complex transition metals against a background of other ions distinguishes the presently claimed resins over the cited reference. Additionally, the ability to selectively complex transition metals under high flow conditions distinguishes the present claimed resins over other complexing resins. (See paragraph bridging pages 3 and 4).

If the resins provided in the Ballard reference were the same as the presently-claimed resins, there would have been no need for the owners of the Ballard patent to develop to presently-claimed resin. The presently-claimed resin is a different composition of matter from the Ballard resin and provides a function not provided by the Ballard resin.

The specific attributes of the present resin that provides this function, i.e., the ability to complex transition metals against a background of other ions under high flow conditions, are recited in the claims, namely, the fact that it is a complexing resin, and the fact that it has amine groups capable of complexing transition metal ions.

Accordingly, it is submitted that the claims distinguish over the Ballard reference.

### **The Nonstatutory Double Patenting Rejection**

Claims 19-21 stand rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 3-4 and 6 of U.S. Patent No. 6,171,489. The Office Action alleges that “[a]lthough the conflicting claims are not identical, they are not patentably distinct from each other because the instant claims encompass those in the cited patent.

As previously argued, even if the instant claims did encompass the present claims, this would not be proper grounds for an obviousness-type double patenting rejection. See MPEP Section 804 II, which states:

Domination and double patenting should not be confused. They are two separate issues. One patent or application "dominates" a second patent or application when the first patent or application has a broad or generic claim which fully encompasses or reads on an invention defined in a narrower or more specific claim in another patent or application. Domination by itself, i.e., in the absence of statutory or nonstatutory double patenting grounds, cannot support a double patenting rejection. *In re Kaplan*, 789 F.2d 1574, 1577-78, 229 USPQ 678, 681 (Fed. Cir. 1986); and *In re Sarrett*, 327 F.2d 1005, 1014-15, 140 USPQ 474, 482 (CCPA 1964). However, the presence of domination does not preclude double patenting. See, e.g., *In re Schneller*, 397 F.2d 350, 158 USPQ 210 (CCPA 1968).

MPEP Section 804 II B 1(a) sets the standard for determining whether or not obviousness-type double patenting exists:

If the application at issue is the later filed application . . . a one-way determination of obviousness is needed in resolving the issue of double patenting, i.e., whether the invention defined in a claim in the application would have been anticipated by, or an obvious variation of the invention defined in a claim in the patent. See, e.g., *In re Berg*, 140 F.3d 1438, 46 USPQ2d 1226 (Fed. Cir.1998).

As discussed above in connection with the rejection under 102(b) over this reference, there is no teaching whatsoever in the claims of the '489 reference, or anywhere in the specification of this reference, that would in any way lead a person skilled in the art to prepare polymeric beads incorporating amine groups capable of complexing a transition metal cation. Thus, the present claims are not obvious over the claims of this reference. Withdrawal of the double patenting rejection is therefore respectfully requested.

Moreover, the ability of the resins claimed herein to complex transition metal ions in the presence of background ions under high flow conditions provides unexpectedly improved results that overcome any obviousness that might exist.

#### **The Information Disclosure Statement**

It is again noted that the Examiner has initialed most of the references cited in the Information Disclosure Statement, with the exception of Corne et al. U.S. Patent No. 1190863 and a number of provisional patent applications. As the Office has access to

these references in its database, it is respectfully requested that these references be reviewed and initialed.

### **Request for Rejoinder**

It is respectfully requested that claim 1 be rejoined with the elected claims upon allowance of the elected claims. This is proper because claim 1 contains the novel technical feature recited in the elected claims, namely amine groups that are capable of complexing a transition metal cation, or the polymeric beads are reacted with one or more compounds to provide amine groups capable of complexing a transition metal cation.

### **Conclusion**

In view of the foregoing arguments and amendments, withdrawal of the rejections is respectfully requested. This application appearing to be in condition for allowance, passage to issuance is also respectfully requested. A Request for a Three-Month extension of time, and a Request for Continued Examination are filed herewith, together with the required fees. It is believed no further fees are due with this submission. If this is incorrect, however, please deduct the amount needed for this Response, including any extension of time required, from deposit account 07-1969.

Respectfully submitted,

/ellenwinner/

Ellen P. Winner  
Reg. No. 28547

GREENLEE, WINNER AND SULLIVAN, P.C.  
4875 Pearl East Circle, Suite 200  
Boulder, CO 80301  
Telephone (303) 499-8080  
Facsimile: (303) 499-8089  
Email: [usptomail@greenwin.com](mailto:usptomail@greenwin.com)  
Attorney Docket No.: 56-04